

NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, N.W., WASHINGTON, D. C. 20418

OFFICE OF SCIENTIFIC PERSONNEL
NASA INTERNATIONAL FELLOWSHIPS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
INTERNATIONAL UNIVERSITY FELLOWSHIPS IN SPACE SCIENCE

June 30, 1964

Quarterly Report
NASr-62

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FELLOWSHIPS

UNPUBLISHED MATERIAL DATA

Current Fellowships

During the period from March 31 to June 30, 1964, there were twenty-four Fellows on the program. Included in this report is a list of current Fellows, with information on their country, sponsorship, term of Fellowship, university they are attending, and field of study.

Countries Represented:

Argentina (1) - Manzano
Belgium (4) - De Couvreur, de Marchin, Gerard, Macar
China (4) - Chao, Chen, Hu, Wu
France (2) - Heraud, Svirine
Germany (5) - Ackermann, Brammer, Brezing, Heilbronner, Tumm
Japan (2) - Miyazaki, Uchida
Netherlands (1) - Smit
Pakistan (1) - Zaman
Peru (1) - Woodman
Spain (3) - Almuzara, Azcarraga, Urrutia

Universities Attended:

University of Arizona (1) - de Marchin
California Institute of Technology (1) - Svirine
University of California - Berkeley (1) - Ackermann
University of Chicago (1) - Wu
University of Colorado (2) - Hu, Macar
Columbia University (3) - Brezing, Chen, Tumm
Harvard University (2) - Gerard, Woodman
State University of Iowa (1) - De Couvreur
University of Maryland (2) - Chao, Smit
Massachusetts Institute of Technology (1) - Brammer
University of Michigan (1) - Zaman
University of Minnesota (2) - Manzano, Miyazaki
Ohio State University (1) - Heilbronner
Princeton University (2) - Azcarraga, Uchida
Stanford University (3) - Almuzara, Heraud, Urrutia

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Fellowship Terminations

Starting in September 1963 and terminating in June 1964 were six academic year appointments sponsored by the European Space Research Organisation; those of Messrs. Chapront, Gustavsson, Liedquist, Pink, and Sanz, and of Dr. Sedlacek.

During this period, Mr. Pedro Sanz received the M.S. degree in Mechanical Engineering at New Mexico State University; on his return to Spain he will work in the Instituto Nacional de Tecnica Aeroespacial "Esteban Terredas" in Madrid.

Dr. Martin Sedlacek completed three advanced research projects in spectrometry, including the design of instruments for an Orbiting Solar Observatory. He has returned to the University of Vienna to supervise graduate work in experimental physics.

Mr. Pierre L. Wodon completed requirements for a doctorate in electrical engineering at the State University of Iowa during his ESRO-sponsored Fellowship from September 1962 to July 1964. His thesis subject was "The Theory of Distributions and Certain of Its Applications in Circuit Analysis and Statistical Theory of Communications." On his return to Belgium, he plans to teach at the Laboratory of Aeronautics and Space Techniques of the University of Liège.

Transfers to Other U. S. Programs

With the approval of their sponsoring agencies, three NASA Fellows transferred to other programs in the United States.

Mr. Tomifumi Godai of Japan obtained his M. S. at the California Institute of Technology, and transferred to a research assistantship at that university to continue his work in jet propulsion. In September 1964 he will resume his position as a research engineer in the Rocket Propulsion Division of the National Aerospace Laboratory of the Japanese Science and Technology Agency.

During his September 1962-June 1964 Fellowship at Harvard University, Mr. Daniel Malaise presented a paper on his work on comets at a Colloquium at the Kitt Peak National Observatory in April 1964. In June 1964 he transferred to a position as Physicist-in-Charge of Project Celestscope, at the Optics Laboratory of the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts. He will return to Belgium in September to continue his work in astrophysics.

Dr. Yutaka Uchida of Japan did research on propagation of very low frequency hydrodynamical waves in the solar chromosphere, during his September 1963-July 1964 Fellowship at Princeton University. In July 1964 he transfers to a position as Research Scientist at the High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado.

[REDACTED]

Fellowship Extensions and Renewals

Three month Fellowship extensions, from June to September 1964, were granted to Messrs. Azcarraga, Brezing, De Couvreur, de Marchin, Heraud, Macar, and Sivirine. Mr. Manzano received a six-month extension from September 1964 to February 1965.

NASA Fellows Chao, Gerard, Smit, Tumm, and Wu received one-year renewals of their appointments, from September 1964 to September 1965.

New Fellowship Applications

Thirty-eight applications for one-year Fellowships, to start in September 1964, have been accepted by universities. The accepted applicants are from Austria, Belgium, England, France, Germany, Italy, The Netherlands, Norway, Pakistan, Peru, Spain, Sweden, and Switzerland.

Five other applications, including two from Germany, one from Italy, and two from Spain, have been withdrawn.

ADDITION OF UNIVERSITY OF ALABAMA

The administration of the University of Alabama inquired from the National Aeronautics and Space Administration concerning the possibility of participation in the International University Fellowship program. As a result, the undersigned made an inspection tour of the University's space science facilities and discussed the program with the staff, at Tuscaloosa and at Huntsville. Appended to this report is a copy of the report of the April 27-29, 1964 visit, with description of facilities available for NASA Fellowship study and research.

The recommendations of this report were accepted and approved by the Space Administration. With the agreement by the University to comply with the conditions of the program, the University of Alabama has been added as a participating university to accept applications for NASA International University Fellowships. The addition of the University of Alabama will supplement the offerings of other institutions on the program in the following major fields:

Electromagnetics and Space Communications; High Temperature Thermodynamics and Plasma Technology; and Gas Dynamics and Re-entry Hypersonics.

Respectfully submitted,


S. S. Steinberg

Assistant Director
Office of Scientific Personnel

NASA INTERNATIONAL UNIVERSITY FELLOWSHIPS IN SPACE SCIENCE

June 30, 1964

CURRENT FELLOWSHIPS

NASA FELLOW	Birth Date	CITIZENSHIP Sponsor	UNIVERSITY Fellowship Term	FIELD OF STUDY Specialty
ACKERMANN Jürgen	10/5/1936	GERMANY FedMinSciRsch	U. CALIFORNIA-Berkeley Sept 1963-Sept 1964	ELECTRICAL ENGINEERING Data Systems
ALMUZARA José L.G.	2/9/1937	SPAIN EurSpRschOrg	STANFORD UNIVERSITY Sept 1962-Sept 1964	AERONAUTICAL ENGINEERING Guidance & Control
AZCARRAGA Alvaro	6/2/1940	SPAIN EurSpRschOrg	PRINCETON UNIVERSITY Sept 1963-Aug 1964	AERONAUTICAL ENGINEERING Aerospace Propulsion
BRAMMER Karl G.H.	8/10/1937	GERMANY FedMinSciRsch	MASS. INST. TECHNOLOGY Sept 1963-Sept 1964	AERO- & ASTRONAUTICS Control Systems
BREZING Dieter	4/16/1935	GERMANY EurSpRschOrg	COLUMBIA UNIVERSITY Sept 1962-Sept 1964	MECHANICAL ENGINEERING Thermodynamics
CHAO Shui-Lin	1/24/1935	CHINA ChineseMinEd	UNIVERSITY OF MARYLAND Sept 1963-Sept 1965	PHYSICS
CHEN Yung-Gann	2/2/1935	CHINA ChineseMinEd	COLUMBIA UNIVERSITY Feb 1963-Feb 1965	ELECTRICAL ENGINEERING Plasma Physics
DE COUVREUR Gilbert A.R.	12/2/1932	BELGIUM BelSpRsch & ESRO	STATE UNIVERSITY OF IOWA Sept 1962-Sept 1964	ELECTRICAL ENGINEERING Data Processing
DE MARCHIN Philippe	12/1/1940	BELGIUM BelSpRsch & ESRO	UNIVERSITY OF ARIZONA Sept 1962-Sept 1964	ELECTRICAL ENGINEERING Electromagnetic Theory

NASA INTERNATIONAL UNIVERSITY FELLOWSHIPS IN SPACE SCIENCE

June 30, 1964

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NASA FELLOW	Birth Date	CITIZENSHIP Sponsor	UNIVERSITY Fellowship Term	FIELD OF STUDY Specialty
GERARD Eric	7/3/1939	BELGIUM EurSpRsSchOrg	HARVARD UNIVERSITY Sept 1963-Sept 1965	ASTRONOMY Radio Astronomy
HEILBRONNER Heinrich K.	7/21/1939	GERMANY FedMinSciRsSch	OHIO STATE UNIVERSITY Jan 1964-Jan 1965	GEODESY
HERAUD Jean-Claude	2/28/1940	FRANCE EurSpRsSchOrg	STANFORD UNIVERSITY Sept 1963-Sept 1964	ELECTRICAL ENGINEERING Wave Propagation
HU Chia-Lun	1/18/1936	CHINA ChineseMinEd	UNIVERSITY OF COLORADO Feb 1963-Feb 1965	ELECTRICAL ENGINEERING Wave Propagation
MACAR Pierre Julien	5/28/1939	BELGIUM EurSpRsSchOrg	UNIVERSITY OF COLORADO Sept 1963-Sept 1964	ASTROPHYSICS
MANZANO Dr. José R.	2/11/1928	ARGENTINA ArgNatComSpRsSch	UNIVERSITY OF MINNESOTA Sept 1963-Feb 1965	PHYSICS Cosmic Radiation
MIYAZAKI Shigeru	11/29/1935	JAPAN Sci&TechAgency	UNIVERSITY OF MINNESOTA Sept 1963-Sept 1964	PHYSICS Plasma & Atmospheric Physics
SIVIRINE Michel E.J.	4/9/1940	FRANCE EurSpRsSchOrg	CAL. INST. OF TECHNOLOGY Sept 1963-Sept 1964	ELECTRICAL ENGINEERING Control Systems
SMIT Gjalt Roelof	8/21/1938	NETHERLANDS NethMinEd	UNIVERSITY OF MARYLAND Sept 1963-Sept 1965	PLASMA PHYSICS

NASA INTERNATIONAL UNIVERSITY FELLOWSHIPS IN SPACE SCIENCE

June 30, 1964

Current Fellowships

NASA FELLOW	Birth Date	CITIZENSHIP Sponsor	UNIVERSITY Fellowship Term	FIELD OF STUDY Specialty
TUMM Günter Walter	4/22/1938	GERMANY EurSpRschOrg	COLUMBIA UNIVERSITY Sept 1963-Sept 1965	NUCLEAR SCI. & ENGINEERING Plasma Physics
UCHIDA Dr. Yutaka	3/27/1934	JAPAN Sci&TechAgency	PRINCETON UNIVERSITY Sept 1963-July 1964	ASTROPHYSICAL SCIENCES Solar Physics
URRUTIA José Luis	3/26/1936	SPAIN EurSpRschOrg	STANFORD UNIVERSITY Sept 1962-Sept 1964	AERO- & ASTRONAUTICS Hydromagnetic Stability
WOODMAN Ronald Francisco	4/22/1934	PERU Geophysical Inst.	HARVARD UNIVERSITY Feb 1964-Feb 1965	PHYSICS Wave Propagation
WU Mao-Fou	7/27/1932	CHINA ChineseMinEd	UNIVERSITY OF CHICAGO Sept 1963-Sept 1965	GEOPHYSICS Upper Atmosphere Physics
ZAMAN Sikandar	11/15/1937	PAKISTAN PakistanSpRsch Com	UNIVERSITY OF MICHIGAN Sept 1962-Aug 1964	AERO- & ASTRONAUTICAL ENG. Propulsion

NATIONAL ACADEMY OF SCIENCES
Contract No. NASR-62
NASA International University Program
Report of Expenditures
April 1, 1964, to June 30, 1964

Balance March 31, 1964 \$233,775.20

Expenditures:

Grants to Institutions *	\$1,630.00
Salaries and Wages	3,912.00
FICA	92.85
Pension Premiums	146.11
Travel - Fellows	2,225.77
Travel - Foreign	6,237.90
Printing & Duplicating	184.23
Communications & Shipping	224.23
Materials & Services	32.36
Insurance	669.60
Books & Periodicals	839.02
Overhead	<u>3,495.36</u>

Total Cost 19,689.43

Balance June 30, 1964 \$214,085.77

* Not included in Overhead Base.

GRANTS TO INSTITUTIONS

Princeton University	\$ (825.00)
University of Michigan	55.00
University of Colorado	400.00
Columbia University	800.00
California Institute of Technology	400.00
Harvard University	400.00
University of Arizona	400.00
	<u>\$ 1,630.00</u>

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2101 CONSTITUTION AVENUE, N.W., WASHINGTON, D. C. 20418

OFFICE OF SCIENTIFIC PERSONNEL NASA INTERNATIONAL FELLOWSHIPS

May 11, 1964

MEMORANDUM

APPENDIX

NASr-62 Report

June 30, 1964

TO: Mr. William F. Hausman - NASA

FROM: Dean S. S. Steinberg - NAS

SUBJECT: Report on Visit of Inspection to University of Alabama

During the period April 27-29, 1964, I visited the University of Alabama, both the main campus at Tuscaloosa and the Huntsville Center, as the result of a letter of September 23, 1963 to Mr. James E. Webb of the National Aeronautics and Space Administration from Dr. Alex S. Pow, Vice-President for Institutional Development at the University of Alabama, inquiring as to the possibility of the University's becoming a participant in the NASA International University Fellowship in Space Science Program.

MAIN CAMPUS AT TUSCALOOSA

Upon arrival at Tuscaloosa I had a conference with Dr. James R. Cudworth, Dean of the College of Engineering, and later with him and the Heads of Engineering Departments, including Professor Colgan H. Bryan, Head of the Department of Aerospace Engineering. Following our discussion, I inspected the laboratories, both undergraduate and graduate, of the College of Engineering, and particularly those related to Space Sciences. Later I conferred at length with Mr. George W. Croker, Director for Contract and Grant Development at the University of Alabama. I explained in detail the method of operation of our program, the type of graduate students we receive, and the obligations that are assumed by a participating university. It was agreed that the \$2,500 grant made by the Academy to the University for each Fellow assigned is a reasonable amount to cover academic and research expenses.

The University's Department of Aerospace Engineering is fully accredited, is adequately staffed, the curriculum is broad and thorough, and the aerospace laboratory has recently been enlarged by new construction and renovations.

Five wind tunnels are available, three of which (one supersonic and two subsonic) are small tunnels used for demonstration and limited

Report of Visit to University of Alabama

research. The fourth tunnel is a single return type, equipped to operate with open or closed throat. Its maximum velocity is 200 miles per hour. A fifth wind tunnel, a modern six-inch by six-inch supersonic tunnel, including instrumentation, storage tank, and compressors, can be used for instruction or research. Also, a shock tube is available for student research and study of high speed aerodynamics.

HUNTSVILLE CENTER OF THE UNIVERSITY

On April 28, I traveled from Tuscaloosa to Huntsville (160 miles) with Dr. Charley Scott, Director of Instruction in Huntsville and Assistant Dean of the Graduate School. We discussed the graduate courses offered by the University both in Tuscaloosa and at the Huntsville Center. The latter offers a wide range of aerospace graduate courses for the benefit of the scientific and engineering personnel employed by the University of Alabama Research Institute, the NASA Marshall Space Flight Center, the Army Missile Command, and by local government contractors engaged in space and missile-related projects. It is estimated that in the Huntsville area there are about 9,000 employees with the Bachelor's degree.

The enrollment this year at the Huntsville Center totals 599 graduate students, of whom 575 intend to obtain a Master's degree, and 24 a Doctor's degree.

The graduate courses at Huntsville are offered in the late afternoon and evening, during three two-hour sessions extending from 3:50 p.m. through 10:15 p.m. More than thirty graduate courses related to the space sciences are offered.

The senior staff members of the University of Alabama Research Institute participate actively in the graduate instruction program at the main campus in Tuscaloosa and at the Huntsville Center. They hold appointments as assistant, associate, and full professors in the respective graduate departments.

Research Support at Huntsville

The University of Alabama Research Institute, under Dr. Rudolph Hermann, as Director, has made great progress during the last two years as a result of the financial support it has received. The principal objective of the Institute is to conduct research in the aerospace and missile-related physical and engineering sciences. The technical staff at the Institute is composed of highly trained research specialists.

Report of Visit to University of Alabama

During the past year, the research staff has increased to a total of 45 members, 15 of them in academic rank.

In 1961, a state-wide referendum was held in Alabama, which approved a \$3,000,000 bond issue to be used for land, buildings and equipment for the University of Alabama Research Institute. This money cannot be used for salaries or for operating expenses.

Also in 1961, the City of Huntsville and Madison County provided \$400,000 for the purchase of about 200 acres of land on which the Research Institute is now completing its first building, at an equipped cost of about \$2,045,000. The expected completion date for this combined laboratory-office building is June 1, 1964. The location is close to the present University Center at Huntsville.

An additional sum of \$800,000 is set aside for the construction and technical equipment of a second building now under design studies. This building will consist of a high-temperature gas dynamics laboratory, which will produce high-speed and high-temperature flow conditions. It will also contain a space environmental laboratory for the study of conditions encountered in space flight. The balance of the bond issue, approximately \$150,000, is reserved for scientific instrumentation. There is also available this year approximately \$100,000 for moveable scientific instrumentation, out of a three-year NASA General-Purpose Grant totaling \$600,000 over the three-year period.

In addition to the grant support, the Research Institute has completed research on five competitive contracts in the past calendar year, four with the Marshall Space Flight Center and one with the Army Missile Command. The current total support from government is about \$270,000. The total budget for operation of the Research Institute during the University fiscal year, beginning October 1, 1964, is \$992,710.

UNIVAC Computer

Upon completion of the first building unit of the Research Institute, a UNIVAC 1107 digital computer (now in storage) will be installed. This unit has a value of about \$3,000,000, and is to be used jointly by the University and its Research Institute and the Sperry-Rand Corporation. The computer remains the property of this company, but it has donated to the University of Alabama four hours of prime time every day for five years; the value of this time is approximately \$2,250,000; the rest of the day will be sold to industry. The UNIVAC will probably be installed this month.

Report of Visit to University of Alabama

PROVISIONS FOR FOREIGN STUDENTS

I looked into the provisions made for foreign students at the University and found that these are adequate. There are at present about 90 foreign students on campus, representing all parts of the world.

There is a Foreign Student Advisory Committee on campus composed of faculty members, and a Foreign Student Advisor. The International Student Association maintains an International House at Tuscaloosa, which provides many activities, such as seminar discussions and programs, coffee hours, dinners, and social gatherings. In addition there are the student organizations, honor societies, concerts, lectures, and athletic events.

Each year an International Week is observed, and the City of Tuscaloosa has inaugurated a Home Hospitality Program whereby every foreign student is invited to visit a home in Tuscaloosa, thus providing the student with an opportunity to learn the customs of an American family, and giving the participating families a chance for better understanding of foreign customs and ideas. The Rotary Club and other service clubs, as well as the Federated Women's Clubs, are all eager to know and assist the foreign student.

I had an opportunity to visit the International House and to confer with members of the staff of the Foreign Student Advisor.

VISIT TO ARMY MISSILE COMMAND

During my stay at Huntsville, and by invitation of President Frank A. Rose of the University of Alabama, I accompanied him to the Army Missile Command and met Major General John G. Zierdt, Commanding Officer. The purpose of the visits was to sign additional contracts for research to be performed by the University of Alabama Research Institute.

RECOMMENDATIONS

1. The participation of the University of Alabama in our International University Fellowship program has been approved by two NASA staff members. In a letter of March 25, 1964 to Mr. Arnold A. Frutkin of NASA, Dr. Ernst Stuhlinger, Director of the Research Projects Laboratory of the George C. Marshall Space Flight Center at Huntsville, states as follows:

"The University of Alabama, in our opinion, would be an effective participant in the NASA International University Fellowships in Space Science Programs. The University of Alabama operation in Huntsville, as indicated in the attached brochure, offers many courses at the M.S. and Ph.D. level in areas of Physics, Mathematics, E.E., M.E., and Engineering Mechanics. There are 19 Ph.D. full-time faculty members

Report of Visit to University of Alabama

associated with the Research Institute and with the Army and NASA activities here. The Redstone Arsenal is one of the largest technical complexes in the nation and can offer many opportunities in the aerospace sciences."

On April 6, 1964, accompanied by Miss Jeanne Kiernan of NASA, I had an interview with Mr. John R. Craig of the NASA Grants and Contracts Office, in which he recommended that the University of Alabama be added as a participating university in our Fellowship program if, as a result of my visit to Tuscaloosa and Huntsville, I found conditions favorable.

2. As a result of my visit, discussions and inspections, I am convinced that the University of Alabama would be a qualified institution for inclusion in the list of University participants in our NASA International University Fellowship Program, for the following reasons:

a. The University would supplement the offerings of some of our present participating institutions in the following major fields:

Electromagnetics and Space Communications
High-temperature Thermodynamics and Plasma Technology
Gas Dynamics and Re-entry Hypersonics.

b. The University's academic atmosphere, the quality of its faculty and research staff, the buildings and equipment, and the programs of graduate space study, would all enhance our NASA program.

c. NASA Fellows assigned to the University of Alabama would have the advantage of a combined program of study and research either at Tuscaloosa or at Huntsville, or at both locations.